are absorbed by the stroma, i. e., held mechanically by molecular affinity, and in different degrees under different conditions, this molecular attraction being overcome by the various solvents unequally. Consequently, it is argued, the pigments cannot exist as grana in the stroma—a conclusion already indicated by recent study both with microscope and ultramicroscope. Many bodies beside cellulose hold the pigments in like fashion. The work is suggestive, but TSWETT'S crucial experiment is not convincing.

Inasmuch as the different pigments are held fast unequally, if a petrolether solution, or even better a solution in carbon bisulfid, be filtered through a column of calcium carbonate, the pigments are distributed in zones, the more firmly adsorbed ones above, the less firmly fixed successively lower. Such a preparation he calls a chromatogram, and the method the chromatographic method.[21]

In a later paper[22] TSWETT gives further details of the technique and analyzes the zones of his chromatogram. The synonymy of the chlorophyll pigments is so tangled that it is almost impossible to compare the work of different investigators. The chromatographic method promises to be of use in demonstrating that there are different pigments, but its value in research seems questionable. —C. R. B.

The Svalöf Experiment Station.—Although the work of the Swedish Agricultural Experiment Station at Svalöf is widely celebrated because of its noteworthy economic results, these results and the means by which they have been attained are not generally understood, owing to the fact that all of its reports are printed in the Swedish language. DE VRIES has devoted two recent papers[23] to a discussion of the Svalöf methods and their scientific significance. In the first of these papers is given a brief history of the station, together with an exposition of the methods employed. The history of the station falls rather naturally into four 5-year periods, each marked by a characteristic advance. During the first period, 1886–1891, the work of introduction and testing of varieties, in the way usually done by Agricultural Experiment Stations, presents nothing unique, the several sorts being treated as units. With the appointment of Dr. H. NILSSON as Director in 1890 begins the second period, in which the discovery was made that each variety is a mixture of a large number of elementary forms and that the latter are the real units with which scientific agriculture must deal. In the third period was carried out the great work of segregating the elementary

[21] TSWETT proposes to call the collective green pigment of leaves chlorophyll; the green fluorescent components chlorophyllins; the yellows already are distinguished as carotins and xanthophylls.

[22] TSWETT, M., Adsorptionsanalyse und chromatographische Methode. Anwendung auf die Chemie des Chlorophylls. Ber. Deutsch. Bot. Gesells. **24**:384–393. 1906.

[23] DEVRIES, HUGO, Die Svalöfer Methode zur Veredelung landwirthschaftlicher Kulturgewächse und ihre Bedeutung für die Selektionstheorie. Arch. für Rass. u. Gesells.-Biol. **3**:325–358. My-Je 1906.

Altere und neuere Selektionsmethode. Biol. Centralbl. **26**:385–395. Jy 1906.

forms, studying their morphological characters, and testing their relative value by parallel cultures. During the last five years the successive generations of these segregated pure races have been followed, with the result that a considerable number of mutants have been found and tested. In both papers DEVRIES compares NILSSON'S pedigree-culture method with the older and still almost universal method of selection in which the undesirable individuals are destroyed and all the best are saved and sown together. He concludes that RIMPAU could have produced the Schlanstedt barley, for which he is so widely celebrated, in four or five years by the Svalöf method, instead of having to devote to it the 20–25 years required by the older method. The magnitude and quickness of the results at Svalöf, where alone the conception of constant elementary forms has been adopted as the basic principle, indicates the importance of the newer conceptions of evolution for scientific agriculture, and these papers of DEVRIES bring to the notice of the non-Swedish world methods which will doubtless lead to most important changes in the conduct of the various agricultural stations.—GEO. H. SHULL.

Report to Evolution Committee.—In a third report to the Evolution Committee of the Royal Society, BATESON, SAUNDERS, and PUNNETT[24] have shown that practically all the complexities encountered in their study of hybrid stocks, sweet peas, and poultry are in essential accord with Mendelian expectation if the assumption is made that what appears externally as a single character may be in reality dependent for its appearance upon the presence of two or more independent allelomorphs or internal units. In some cases the nature of these internal units is apparent, as when the presence of one always changes a pigment from red to blue; but in other cases there is no clue to the nature of the individual allelomorph, as when the combination of two white sweet peas invariably produce colored offspring owing to the bringing together of two allelomorphs the combined action of which is necessary to the production of color. In stocks the presence of hoary pubescence is shown to depend upon the simultaneous presence of four independent allelomorphs, two of which are also necessary to the production of colored flowers. At the New Orleans meeting of the Botanical Society of America (December 1905) the reviewer presented a paper on the "Latent characters of a white bean," in which it was shown that the color of purple mottled beans obtained as an F_1 from a cross between yellow and white is dependent upon the simultaneous presence of three distinct allelomorphs. In that paper it was predicted that BATESON'S results on stocks and sweet peas would find a satisfactory explanation on the same grounds without the assumption of complex and inexplicable synthesis and resolution of "hypallelomorphs" as attempted in the earlier Reports to the Evolution Committee. The completeness with which the new point of view is demonstrated by these further investigations will do much to strengthen the view that Mendelian behavior is a more common

[24] BATESON, W., SAUNDERS, Miss E. R., PUNNETT, R. C., Reports to the Evolution Committee. III. pp. 52. London: Harrison & Sons. 1906.